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Vulnerability assessment tools for infectious threats and AMR: a scoping review protocol

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Abstract

Introduction

This protocol will guide and explain the working process of a systematic scoping review on vulnerability assessment tools in the field of infectious disease outbreaks and antimicrobial resistance (AMR) crises.

The scoping review will conduct a systematic review to appraise existing instruments or practices that identify vulnerable groups and factors associated with the spread of infectious diseases and AMR, e.g. through human-animal-environment engagements. To our knowledge, this is the first planned systematic scoping review of vulnerability assessment tools for disease outbreaks and AMR, taking into account practices at the human-animal-environment interface that can lead to infections, pathogen spillovers or epidemics. Because considerable research has been conducted on vulnerability, disasters and climate change, we will also assemble tools developed from these fields. Given the broad nature of vulnerability, we aim to allocate studies discerning the process of identifying vulnerable or at-risk groups during a crisis, instead of studies taking vulnerability as a starting point.

Methods and Analysis

To develop the protocol, we used the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols checklist (PRISMA-P 2015) in compliance with the PRISMA Extension for Scoping Reviews Explanation and Elaboration. With the assistance of an experienced research librarian, we developed the search strategy, which targeted the following databases: Medline, Global Health database, Web of Science and Embase. A second strategy was developed for Epistemonikos, African Journals Online (AJOL) and Global Index Medicus because these databases do not provide the infrastructure for an advanced search. We consider studies published between 1978 and 2019 and include

articles, book chapters, websites, and grey literature from selected nongovernmental organizations (NGOs) and nonprofit organizations (NPOs) working in the health field. We contacted them directly regarding whether they were working with or had developed a vulnerability assessment tool. To address the dynamic nature of our investigation, we developed a flow diagram which we continually update to reflect the selection process. Two reviewers independently screen the literature and resolve conflicts through discussion rounds. Data abstraction will be conducted by four researchers through inductive and deductive coding. Extracted data will be systematically compared and divergences highlighted. If the available material allows, we will conduct a thematic analysis.

Dissemination

The purpose of this review is to disseminate a catalogue of vulnerability assessment tools and a brief summary of key results and recommendations for SoNAR-Global partners in Bangladesh, Ukraine and Uganda.[1] The catalogue will be made publically available.

Article Summary

Strengths and limitations of the study

- Identification of knowledge gaps in existing studies
- Comprehensive mapping of literature on methods to identify vulnerability in disasters using systematic review methodology
- Exploratory approach taking into consideration multiple research approaches and disciplines
- Application of searches in heterogeneous sources (e.g. Global Health database, AJOL)
- Practical guidance based on findings for policymakers and stakeholders
- Short duration (six months) of scoping review

[1] SoNAR-Global is funded by the Horizont 2020 program of the European Union and aims to build a sustainable, international social sciences network to engage the active participation of the social sciences in the prevention and response to infectious threats and AMR.

INTRODUCTION

Rationale

Increased human mobility, global commodity chains, urbanization, and climate change have all altered the interaction of humans, microbes and broader ecological conditions in the 21st century, catalyzing the emergence and re-emergence of infectious diseases. Recent outbreaks of Ebola, SARS and Zika have triggered international health emergencies, often exacerbated by the lack of appropriate treatments and preventive vaccines.

Similarly, antimicrobial resistance (AMR) has been identified as a substantial threat to global health security with uncontrolled use of antibiotics, antivirals, and antiparasitic treatments, rendering microbes increasingly resistant to existing medicines. Humans, animals and the environment, in turn, are mutually affected by these health threats, highlighting the need to engage with complex socio-biological ecosystems. As a consequence, emerging infectious diseases (EIDs) and antimicrobial resistance (AMR) urgently require transformations in global public health governance. EIDs and AMR are not only medical problems; they require careful attention to the relationship between infectious events, political, economic and ecological conditions, and local communities and the marginalized peoples within struggling communities. Such attention remains particularly important when instability (caused by infectious disease outbreaks, conflicts, or other stresses) exaggerates local inequalities, hampering effective preparedness and response efforts. Devastating epidemics have struck frequently in countries and among populations already shattered by government neglect, forced migration, unrest, or civil war (Echenberg, 2011; Napier 2013; Mladovsky 2007). What these insights reveal is that people living in unstable conditions remain disproportionately *vulnerable* to infectious threats. While structural inequalities remain causal, remedies are more than structural. Understanding

vulnerability, we argue, is more about who has and does not have voice. In conditions of extreme inequality, 'giving voice' is complex. Our purpose, therefore, is to understand the barriers that keep community members in crisis contexts from representing their own needs.

With this goal in mind, vulnerability assessments identify specific groups at greatest risk of marginalization and thus at greatest risk of suffering disproportionately the consequences of epidemic outbreaks and AMR (e.g. due to social, cultural, political, economic or other context-specific reasons that influence people's resilience, adaptive capacity, coping mechanisms or capacity to recover). To determine the most effective vulnerability assessment tools available, we will map existing tools for assessing locally relevant case definitions of vulnerability.

Objectives

This scoping review will explore vulnerability assessment tools to identify groups and communities most vulnerable to infectious threats.

Main objectives:

- Systematically review and appraise existing instruments to assess human vulnerability and factors associated with the incidence and spread of infectious diseases and AMR - i.e. through interactions of humans, animals and surrounding environments;
- Discern overlaps and gaps among the tools.

METHODS

The scoping review builds on the PRISMA-ScR (Preferred Reporting Items for Scoping Reviews and Meta-Analyses extension for Scoping Reviews) checklist (Tricco et al. 2018). The protocol draws from the PRISMA-P 2015 (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) checklist and is applied in compliance with the PRISMA Extension for Scoping Reviews Explanation and Elaboration.

Eligibility criteria

The PICO (Population, Intervention, Comparator, Outcome) framework for diagnostic studies assisted us in developing our search strategy.[2] The PICO framework is derived from evidence-based medicine and might not be considered applicable to our scoping review as its main focus is on qualitative research. However, following further consideration, the PICO for diagnostic studies was deemed suitable as a framework to structuring the search of vulnerability assessment tools. The following offers a breakdown of this reasoning:

2 See: UT Health Science Center, University of Canberra

Population

The review focuses on tools that seek to identify social groups most vulnerable to infectious diseases. As of now, it is unclear how much literature on methods discerning vulnerable groups in disease outbreaks exists. Therefore, comparable tools from the climate change field (e.g. vulnerability assessment in natural hazards) will also be considered. AMR and pathogens with pandemic potential are prioritized; specifically influenza, measles and certain viral hemorrhagic fevers (Ebola Virus Disease, Lassa fever, Crimean-Congo hemorrhagic fever, Rift Valley fever).

Studies addressing mutual engagements and interaction between humans, animals and environments will also be considered eligible.

Intervention

We identify tools developed for health emergencies, e.g. disease outbreaks or epidemics complicated by AMR, to assess, evaluate, and identify vulnerable groups and practices. As mentioned above, we also include vulnerability assessment tools linked to natural hazards or disasters in our search.

Of interest are tools that consider categories of social (e.g. gender, age, education, economic status [CDC 2015]) and structural vulnerability (e.g. access to healthcare and social services), as well as those that explore recently emerging, less visible and locally relevant vulnerable groups (Napier 2013, Zarowsky 2012).

Comparators

Studies that systematically compare different vulnerability assessment tools will be included in our review.

Outcomes

Outcomes of interest are as follows:

- Methodological characteristics of vulnerability assessment tools or practices;
- Utility and applicability of vulnerability assessment tools;
- Specific information or guidance on EIDs and AMR;
- Specific information on vulnerable groups.

Publication type, study design, language and time frame

Articles, websites, book chapters, and grey literature from NGOs and NPOs working in the field of health will be considered relevant. Publications in English, French, Ukrainian, Russian or Bangla will be included. SoNAR-Global partners in Ukraine and Bangladesh will assist in reviewing papers in Ukrainian, Russian or Bangla. In this review we consider studies published between 1978 and 2019.[3] Qualitative, quantitative, mixed methods and integrated qualitative/quantitative tools are covered, including ethnographic investigations and systematic reviews, among others.

Information sources

We conducted an initial search for reviews on vulnerability (assessment tools) in selected databases (Epistemonikos, PubMed, Scopus, Web of Science and Prospero). We have done so to avoid duplicating existing reviews of the same subject matter and to refine our search terms.

The search strategy was developed by a trained librarian and the first author (MJ) and was revised according to feedback from co-authors. We developed a first search strategy for the Global Health database and, following further reflection, agreed to expand the search by including literature on disasters and risk reduction. We applied the second (revised)

3 In 1978, the key role of primary health care in promoting health for everyone was agreed upon in the declaration of Alma Ata. This marks a critical waypoint in considering health and wellbeing also as structurally determined by an individual's relative social positionality - an idea inherent in the concept of vulnerability more generally.

search strategy to Medline and made further minor adjustments. The results from the Medline search varied considerably from the first Global Health database search. The reason for these different results emerged out of adjustments made to the search strategy, but could also be the consequence of differing contents in the two databases.[4]

The final search string was applied to Medline and can be found in the appendix. The search terms were adjusted and applied to the following databases: Global Health database (Ovid), Web of Science and Embase. For Epistemonikos, Global Index Medicus (WHO database) and AJOL (African Journals Online), we used a simplified search strategy because these databases do not allow for complex searches. These search terms can be requested from the corresponding author.

Grey literature was searched in OpenGrey and on the following websites: Medbox, Social Science in Humanitarian Action, Social Science Research Network (SSRN), Assessment Capacities Project (ACAPS) and Measure Evaluation.

Additional sources were identified using snowball strategies and, in particular, the mining of references in published reviews and articles. Further, we contacted NGOs, NPOs and selected governmental organizations directly to enquire whether they worked with or had developed vulnerability assessment tools. [5]

We imported the search results into Endnote and removed all duplicates. The remaining references were imported into Rayyan for further screening.[6]

[4] The process of developing the search strategy took approximately one month.

[5] NGOs, NPOs and governmental organizations contacted: Médecins Sans Frontières (MSF) Austria, Paris, US, Epicentre, International Committee of the Red Cross (ICRC) Geneve, Medair, Globalmedic, United Nations (UN), Real Medicine Foundation, European Centre for Disease Prevention and Control (ECDC), International Medical Corps, United States Agency for International Development (USAID)

[6] Apparently, superfluous spaces appear when literature is moved from the database to Endnote (e.g. gaps before author names). To import references into Rayyan, all superfluous spaces had to be removed by hand. This process took about one day. We observed that the superfluous spaces varied between databases.

Selection process and data extraction

We defined the following inclusion/exclusion criteria:

Inclusion criteria:

- Vulnerability assessment tools or practices in the context of disease outbreaks, AMR and natural disasters;
- Humans or human-animal interaction (One Health);
- Concepts (e.g. vulnerability, resilience, coping, adaptive capacity);
- Any geographic location (special focus on Uganda, Ukraine, Bangladesh);
- Publication type: articles (peer-reviewed and non-peer-reviewed), websites, book chapters and reports from NGOs and NPO working in the area of health;
- Period between 1978 and 2019;
- Languages: English, French, Ukrainian, Russian, Bangla;
- Study design: Quantitative, qualitative, mixed-methods studies and integrated qualitative/quantitative studies, ethnographies, systematic reviews and case studies.

Exclusion criteria:

- Certain epidemiological studies (e.g. prevalence studies, surveillance and monitoring);
- Studies dealing with vulnerable groups but not describing how these were identified;
- Virological, pre-clinical and clinical studies;

Two reviewers independently examine titles and abstracts in Rayyan, a web application to screen literature. Each study will be labeled with reasons for inclusion and exclusion. Distinct labels will be used for vulnerability assessment tools used in the field of climate change and in the context of disease outbreaks.

Discussion rounds are planned for the first two weeks of screening to clarify questions concerning the screening process and to specify inclusion criteria. The screening will be blinded, so that reviewers' decisions will not be visible until all conflicting decisions are resolved.

Throughout the search - starting from numbers of records retrieved from databases to final search results - we provide a search flow diagram to visualize our selection process (PRISMA-ScR statement appendix, figure 1, flowchart).

Following this step, four reviewers will independently review the full texts and will extract data from the selected studies with focus on author, article type, type of threat (natural hazard, infectious disease or AMR), year, country and type of intervention. Further, data will be extracted relating to the review objectives: vulnerability assessment tools (detailing methods used) and outcomes of vulnerability assessments (e.g. specific vulnerable groups or communities). Finally, extracted data will be systematically compared and divergences acknowledged; limitations of the vulnerability assessment tools will be noted.

Before extracting the relevant information, we will sample 5 papers and test the extraction criteria, which will subsequently be revised, if necessary (see Tricco et al 2017:4). We will not assess each study's methodology for quality, pursuant to guidelines for scoping reviews (Peters et al. 2015).

Data synthesis

A catalogue of vulnerability assessment tools will be provided and their similarities and divergences summarized.

Dissemination

Findings of the scoping review will be summarized in a one-page brief containing details on key results and recommendations for the SoNAR-Global partners in Bangladesh, Ukraine and Uganda (Tricco et al. 2016:16). The review of existing assessment tools will be disseminated to our program partners and the public. Local resources permitting, key partners and regional stakeholders will pilot the tool(s) best suited to infectious disease or AMR-related emergencies.

Author Statement

MJ and RK conceptualized the research, MJ wrote the protocol, LL helped in writing and editing the protocol, TG-V, MD, DN, EJ and RK reviewed and edited the protocol.

Acknowledgement

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Competing interests statement

None declared.

Data statement

All data can be requested from the corresponding author.

Registration

No registration foreseen.

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Appendix

Search strategies

Database: Global Health database (ovid), 4 March 2019

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1 ((vulnerab* or disadvant* or low income or at risk* or marginal* or key) adj6 (population* or group* or people* or communit*)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (32565)

2 exp infectious diseases/ (48098)

3 exp ebolavirus/ (3701)

4 exp crimean-congo haemorrhagic fever virus/ (1409)

5 exp marburgvirus/ (651)

6 exp lassa virus/ (702)

7 exp rift valley fever virus/ (1577)

8 exp measles virus/ (7768)

9 exp influenza/ (28512)

10 exp drug resistance/ (97089)

11 (infectious diseas* or ebola* or measles or influenza* or flu).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (119288)

12 ((marburg or lassa or rift valley or congo) adj4 (virus* or fever)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (4260)

13 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 (210937)

14 1 and 13 (2299)

15 ((vulnerab* or rapid or barefoot or participat* or context* or qualitat* or quantitat*) adj6 (assess* or approach* or analys* or evaluat*)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (61363)

16 (vulnerab* adj6 measur*).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (293)

17 toolkit*.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (585)

18 mixed method*.mp. (3802)

19 15 or 16 or 17 or 18 (64836)

20 14 and 19 (120)

21 (one health or human* environment* or human* plant* or zoonotic* disease* or zoonos* or vector* born* or one medicin or bio social* or biosocial*).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (126786)

22 14 and 21 (257)

23 22 not 20 (236)

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Database: Medline, 1 April 2019

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1 Vulnerable Populations/ (9196)

2 ((vulnerab* or disadvant* or low income or at risk* or marginal* or key) adj5 (population* or group* or people* or communit*)).ti,ab,kf,kw. (73757)

3 1 or 2 (80138)

4 ((vulnerab* or rapid or barefoot or participat* or context* or qualitat* or quantitat*) adj6 (assessment* or approach* or analy* or evaluat* or measur* or tool*)).ti,ab,kw,kf. (404666)

5 mixed method*.ti,ab,kf,kw. (16584)

6 4 or 5 (416134)

7 3 and 6 (5320)

8 exp Communicable Diseases/ (33526)

9 hemorrhagic fevers, viral/ or hemorrhagic fever, crimean/ or hemorrhagic fever, ebola/ or lassa fever/ or marburg virus disease/ or rift valley fever/ (8588)

10 Measles/ (13090)

11 Influenza, Human/ (46095)

12 (infectious diseas* or ebola* or measles or influenza* or flu).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (250987)

13 ((marburg or lassa or rift valley or congo) adj4 (virus* or fever)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (5286)

14 8 or 9 or 10 or 11 or 12 or 13 (277516)

15 exp anti-bacterial agents/ or exp antifungal agents/ or exp antiparasitic agents/ or exp antiviral agents/ (1241843)

16 (antibiotic* or anti biotic* or antimicrob* or anti microb* or antibacterial* or anti bacterial* or antifungal* or anti fungal* or antiparasit* or anti parasit*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (680643)

17 15 or 16 (1494415)

18 drug resistance/ (45425)

19 resistan*.mp. (1030696)

20 ((suboptimal*' or 'sub optimal*') adj4 ('use' or utilization* or utilisation* or usage or prescription* or prescrib* or administrat*)).ti,ab,kw,kf. (1456)

21 overuse.ti,ab,kw,kf. (9645)

22 18 or 19 or 20 or 21 (1040537)

23 17 and 22 (283378)

24 exp drug resistance, microbial/ or exp drug resistance, multiple/ (165500)

25 (amr or antimicrobial resistance*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (19481)

26 23 or 24 or 25 (315780)

27 disasters/ or exp disaster planning/ or exp emergencies/ or exp natural disasters/ (76941)

28 exp Climate Change/ (15831)

29 (disaster* or outbreak* or crisis or crises or natural hazard* or emergency or emergencies or climate change or pandemic* or endemic*).ti,ab,kf,kw. (506063)

30 (storm or storms or flood* or drought* or earthquake* or wildfire* or avalanche* or tornado* or cyclon* or hurrican*).ti,ab,kf,kw. (57428)

31 27 or 28 or 29 or 30 (579969)

32 (one health or human* environment* or human* plant* or zoonotic* disease* or zoonos* or vector born* or one medicin* or bio social* or biosocial*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (33611)

33 One Health/ (141)

34 Zoonoses/ (15656)

35 32 or 33 or 34 (33611)

36 7 and 14 (114)

37 7 and 26 (22)

38 7 and 31 (645)

39 36 or 37 or 38 (720)

40 limit 39 to yr="1978 - 2019" (720)

41 35 and 40 (24)

42 40 not 41 (696)

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Reporting checklist for protocol of a systematic review.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a
Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	n/a
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify the	13

		guarantor of the review	
Amendments			
	#4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	n/a
Support			
Sources	#5a	Indicate sources of financial or other support for the review	13
Sponsor	#5b	Provide name for the review funder and / or sponsor	13
Role of sponsor or funder	#5c	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	13
Introduction			
Rationale	#6	Describe the rationale for the review in the context of what is already known	4
Objectives	#7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	6,7
Methods			
Eligibility criteria	#8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	8
Information sources	#9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	9
Search strategy	#10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	16,17,18
Study records - data management	#11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	11
Study records -	#11b	State the process that will be used for selecting studies	11

selection process		(such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	
Study records - data collection process	#11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	11
Data items	#12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	11
Outcomes and prioritization	#13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	8
Risk of bias in individual studies	#14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	n/a
Data synthesis	#15a	Describe criteria under which study data will be quantitatively synthesised	n/a
Data synthesis	#15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	n/a
Data synthesis	#15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	12
Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the type of summary planned	12
Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	n/a
Confidence in cumulative evidence	#17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	n/a

BMJ Open

Vulnerability assessment tools for infectious threats and antimicrobial resistance: a scoping review protocol

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Vulnerability assessment tools for infectious threats and antimicrobial resistance: a scoping review protocol

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Abstract

Introduction

This protocol will guide and explain the working process of a systematic scoping review on vulnerability assessment tools in the field of infectious disease outbreaks and antimicrobial resistance (AMR) crises. The scoping review will appraise existing tools or methodologies to identify local level vulnerabilities in the context of infectious disease outbreaks and antimicrobial resistance (AMR). Due to this focus on infectious threats and AMR, the review also considers articles utilizing a “One Health” approach to assess the vulnerability of individuals, groups and practices in human-animal-environment interactions. Given the broad nature of vulnerability, we aim to allocate studies discerning the process of identifying vulnerable or at-risk groups during a crisis, instead of studies taking vulnerability only as a starting point. Because considerable research has been conducted on vulnerability, disasters and climate change, we will also assemble tools developed from these fields. To our knowledge, this is the first planned systematic scoping review of vulnerability assessment tools for disease outbreaks and AMR, taking into account practices at the human-animal-environment interface that can lead to increased risk of exposure of individuals to infections, pathogen spillovers or epidemics.

Methods and Analysis

To develop the protocol, we used the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols checklist (PRISMA-P 2015) in compliance with the PRISMA Extension for Scoping Reviews Explanation and Elaboration. With the assistance of an experienced research librarian, we developed the search strategy, which targeted the following databases: Medline, Global Health database, Web of Science and Embase. A second strategy was developed for Epistemonikos, African Journals Online (AJOL) and Global Index Medicus because these databases do not provide the infrastructure for an advanced search. We consider studies published between 1978 and 2019 and include

articles, book chapters, websites and grey literature from selected nongovernmental organizations (NGOs) and nonprofit organizations (NPOs) working in the health field. We contact them directly regarding whether they are working with or have developed a vulnerability assessment tool. To address the dynamic nature of our investigation, we develop a flow diagram which we continually update to reflect the selection process. Two reviewers (MJ and LL) independently screen the literature and resolve conflicts through discussion rounds. Data extraction will be conducted by four researchers (MJ, LL, EJ, RK) through inductive and deductive coding. Extracted data will be systematically compared and divergences highlighted.

Ethics and Dissemination

Ethical approval is not required because this study does not involve collection of primary data. The purpose of this review is to disseminate a catalogue of vulnerability assessment tools and a brief summary of key results and recommendations for SoNAR-Global partners in Bangladesh, Ukraine and Uganda. The catalogue will be made publically available. On the basis of our results, SoNAR-Global partners will pilot one of these tools.

Article Summary

Strengths and limitations of the study

- Identification of knowledge gaps in existing studies
- Comprehensive mapping of literature on methods to identify vulnerability in disasters using systematic review methodology
- Exploratory approach taking into consideration multiple research approaches and disciplines
- Application of searches in heterogeneous sources (e.g. Global Health database, AJOL)
- Short duration (six months) of scoping review

INTRODUCTION

Rationale

Increased human mobility, global commodity chains, urbanization and climate change have all altered the interaction of humans, microbes and broader ecological conditions in the 21st century, catalyzing the emergence and re-emergence of infectious diseases.[1] Recent outbreaks of Ebola, SARS and Zika have triggered international health emergencies, often exacerbated by the lack of appropriate treatments and preventive vaccines.[2, 3]

Similarly, antimicrobial resistance (AMR) has been identified as a substantial threat to global health security with uncontrolled use of antibiotics, antivirals and antiparasitic treatments, rendering microbes increasingly resistant to existing medicines.[4] Humans, animals and the environment, in turn, are mutually affected by these health threats, highlighting the need to engage with complex socio-biological ecosystems.[5, 6] As a consequence, emerging infectious diseases (EIDs) and antimicrobial resistance (AMR) urgently require transformations in global public health governance.[7-9]

EIDs and AMR are not only medical problems; they require careful attention to the relationship between infectious events, political, economic and ecological conditions, and local communities and the marginalized people within struggling communities. Such attention remains particularly important when instability (caused by infectious disease outbreaks, conflicts or other stresses) exaggerates local inequalities, hampering effective preparedness and response efforts. Devastating epidemics have struck frequently in countries and among populations already shattered by government neglect, forced migration, unrest or civil war.[10-12] What these insights reveal is that people living in unstable conditions remain disproportionately *vulnerable* to infectious threats.

In this context, the SoNAR-Global H2020 project aims at building a social science network to engage the active participation of social sciences and to promote complementarity and synergy in the governance of prevention and response to infectious threats and AMR. Eventually, in order to do this effectively, it is crucial to engage relevant stakeholders in addressing susceptibilities and lack of coping and adaptive capacities. This requires a solid understanding of those aspects that can be obtained through vulnerability assessments.

Until now, several disciplines - be it anthropology, sociology, psychology, geography or ecology - but also organizations outside the academic context take a stance on vulnerability. However, there is no universally valid model of vulnerability and "no standardized procedure for measuring vulnerability".[13(p636)] Birkmann et al.[14] synthesize four factors of vulnerability from disaster risk reduction and climate change adaptation in order to provide a holistic conceptual framework to operationalize vulnerability: "(...) exposure of a society or system to a hazard or stressor, the susceptibility of the system or community exposed and its resilience and adaptive capacity".[14(p207)] Factors contributing to vulnerability change over a period of time and are place specific.[14]

Similarly, our understanding of vulnerability is dynamic. We are less interested in tools that work with predetermined categories of vulnerability (e.g. demographic characteristics such as age, gender and ethnicity) but wish to explore vulnerability specifically in the local context. In our opinion, the most effective assessment tools allow populations affected by a disaster to identify their own needs rather than the vulnerability label is imposed on them.[15] This means to include local knowledge, to involve local people in identifying vulnerable groups and to pay attention to culture in order to gain an understanding of local perceptions of vulnerability and risk.[16]

Objectives

In our scoping review, we seek to explore and map vulnerability assessment tools with (or without) conceptual underpinnings and procedures how to measure or identify vulnerability employing quantitative, qualitative or mixed methods. We take into consideration vulnerability assessment tools or methodologies that assess locally relevant case definitions of vulnerability[11] and identify specific groups at greatest risk of marginalization and thus at greatest risk of suffering disproportionately the consequences of a disaster. This could be due to social, cultural, political, economic or other context-specific reasons that influence people's exposure, susceptibility, resilience (and coping mechanisms), adaptive capacity or capacity to recover. Additionally, we seek to find vulnerability assessment tools that are tailored to infectious threats (and AMR). This is why we look for both local-level assessments and tools targeted at infectious threats.

A preliminary search of literature and already existing reviews yielded few studies on vulnerability assessment tools tailored to infectious threats, but a significant amount of literature in the field of climate change. To fill the assumed gap of studies in the context of vulnerability assessment tools and infectious threats, we will also take into account studies exploring practices at the human-animal-environment interface, providing insights on practices that expose certain groups of people to infections or pathogen spillovers.

Main objective:

- Systematically review and appraise existing instruments to assess local-level vulnerability in the context of infectious threats and AMR

Secondary objective:

- Identify factors associated with exposure to infectious threats and AMR - i.e. through interactions of humans, animals and surrounding environments;

METHODS

The scoping review builds on the PRISMA-ScR (Preferred Reporting Items for Scoping Reviews and Meta-Analyses extension for Scoping Reviews) checklist.[17] The protocol draws from the PRISMA-P 2015 (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) checklist and is applied in compliance with the PRISMA Extension for Scoping Reviews.[17, 18]

Eligibility criteria

We used the PICO (Population, Intervention, Comparator, Outcome) framework for diagnostic studies to develop our search strategy.[19] The PICO framework is derived from evidence-based medicine and might not be considered applicable to our scoping review as its main focus is on qualitative research. However, following further consideration, the PICO for diagnostic studies was deemed suitable as a framework to structuring the search of vulnerability assessment tools. The following offers a breakdown of this reasoning:

Population

The review focuses on tools that seek to identify social groups most vulnerable to infectious threats. As of now, it is unclear how much literature on methods discerning vulnerable groups in disease outbreaks exists. Therefore, comparable tools from the climate change field (e.g. vulnerability assessment in natural hazards) will also be considered. We will include all infectious diseases but will have a special focus on infectious threats that specifically affect Global-SoNAR partner countries, such as influenza, measles and certain viral hemorrhagic fevers (Ebola Virus Disease, Lassa fever, Crimean Congo hemorrhagic fever, Rift Valley fever). The selection of these threats was discussed with Global-SoNAR partners.

Studies addressing mutual engagements and interaction between humans, animals and environments will also be considered eligible.

Intervention

We aim to find tools that assess local-level vulnerability in the context of infectious threats and AMR. As mentioned above, we also include vulnerability assessment tools linked to natural hazards or disasters in our search. Of interest are tools that explore recently emerging, less visible and locally relevant vulnerable groups.[11, 20] Ideally, populations affected by a disaster are involved in identifying their own needs.

Comparators

Studies that systematically compare different vulnerability assessment tools will be included in our review.

Outcomes

Outcomes of interest are as follows:

- Methodological characteristics of vulnerability assessment tools or practices (e.g. quantitative, qualitative, mixed methods)
- Conceptual or theoretical frameworks of vulnerability assessment tools
- Degree of involvement of the affected population
- Utility and applicability of assessment tools; (e.g. is the tool easy to use for local stakeholders or are experts involved?)
- Specific information or guidance on EIDs and AMR; (e.g. is the tool tailored to infectious threats?)
- Specific information on vulnerable groups (e.g. who is identified as vulnerable? Why and what makes people vulnerable in a specific context?)

Publication type, study design, language and time frame

Articles, websites, book chapters and grey literature from NGOs and NPOs working in the field of health will be considered relevant. Publications in English, French, Ukrainian, Russian or Bangla will be included. SoNAR-Global partners in Ukraine and Bangladesh will assist in reviewing papers in Ukrainian, Russian or Bangla. In this review we consider studies published between 1978 and 2019 because the key role of primary health care in promoting health for everyone was agreed upon in the declaration of Alma Ata in 1978. This marks a critical waypoint considering health and wellbeing as structurally determined by an individual's social position – an idea inherent in the concept of vulnerability more generally.[21] Qualitative, quantitative, mixed methods and integrated qualitative/quantitative tools are covered, including ethnographic investigations and systematic reviews, among others.

Information sources

We conducted an initial search for reviews on vulnerability (assessment tools) in selected databases (Epistemonikos, PubMed, Scopus, Web of Science and Prospero). We have done so to avoid duplicating existing reviews of the same subject matter and to refine our search terms.

We used a vulnerability assessment tool as a reference paper[11] of one of the authors (DN), which has been successfully applied in various emergency settings. It is an easy to use manual to discern local-level vulnerabilities for effective resource allocation and reflects what we look for in our search.

The search strategy was developed by a trained librarian of the University Library, Medical University of Vienna, and the first author (MJ) and was revised according to feedback from co-authors (MD). The selection of databases was also discussed by the librarian and the first author. Ovid's Medline was chosen over PubMed because a more nuanced search

could be configured in Medline.[22] Instead of searching two similar databases, we decided to use heterogeneous sources (e.g. Global Health database, Web of Science, AJOL and grey literature databases) to allow for differing contents.

We developed a first search strategy for the Global Health database and, following further reflection, agreed to expand the search by including literature on disasters and risk reduction. We applied the second (revised) search strategy to Medline and made further minor adjustments. The results from the Medline search varied considerably from the first Global Health database search. The reason for these different results emerged out of adjustments made to the search strategy, but could also be the consequence of differing contents in the two databases. The final search strategy was applied to Medline and can be found in the supplementary file.

The search terms were adjusted and applied to the following databases: Global Health database (Ovid), Web of Science and Embase. For Epistemonikos, Global Index Medicus (WHO database) and AJOL (African Journals Online), we used a simplified search strategy because these databases do not allow for complex searches. The terms used for these databases are presented in the supplementary file. Grey literature was searched in OpenGrey and on the following websites: Medbox, Social Science in Humanitarian Action, Social Science Research Network (SSRN), Assessment Capacities Project (ACAPS) and Measure Evaluation. Additional sources were identified using snowball strategies and, in particular, the mining of references in published reviews and articles. Further, we contacted NGOs, NPOs and selected governmental organizations directly to enquire whether they worked with or had developed vulnerability assessment tools. We imported the search results into Endnote and removed all duplicates. The remaining references were imported into Rayyan QCRI for further screening.[23]

Selection process and data extraction

We defined the following inclusion/exclusion criteria:

Inclusion criteria:

- Vulnerability assessment tools or practices in the context of disease outbreaks, AMR and natural disasters
- Humans or human-animal interaction (One Health)
- Concepts (e.g. vulnerability, resilience, coping, adaptive capacity)
- Any geographic location (special focus on Uganda, Ukraine, Bangladesh)
- Publication type: articles (peer-reviewed and non-peer-reviewed), websites, book chapters and reports from NGOs and NPO working in the area of health
- Period between 1978 and 2019
- Languages: English, French, Ukrainian, Russian, Bangla
- Study design: Quantitative, qualitative, mixed-methods studies and integrated qualitative/quantitative studies, ethnographies, systematic reviews and case studies

Exclusion criteria:

- Studies dealing with vulnerable groups but not describing how these were identified
- Studies which do not address tools, methodologies or practices to discern vulnerability

Two reviewers with a social science background (MJ and LL) independently examine titles and abstracts in Rayyan QCRI, a web application to screen literature.[23] Each study will be labeled with reasons for inclusion and exclusion. Distinct labels will be used for vulnerability assessment tools used in the field of climate change and in the context of disease outbreaks. Discussion rounds between reviewers (MJ and LL) are planned for the first two weeks of screening to clarify questions concerning the screening process and to specify inclusion criteria. The screening will be blinded, so that reviewers' decisions will not be visible until all conflicting decisions are resolved.

Throughout the search – starting from numbers of records retrieved from databases to final search results – we provide a search flow diagram to visualize our selection process.[17] Following this step, four reviewers (MJ, LL, EJ and RK) will independently review the full texts and will extract data from the selected studies with focus on author, article type, type of threat (natural hazard, infectious disease or AMR), year, country and type of intervention. As all authors have a social science background, the data extraction will most likely resemble a thematic analysis. Variables for data extraction will be defined inductively (variables come up while familiarizing with the data) and deductively. According to the review objectives and outcomes, we predefined the following variables: methodology used (e.g. qualitative, quantitative or mixed methods), conceptual or theoretical framework of the assessment tool, degree of involvement of the affected population, applicability and utility of the tools and results of vulnerability assessments (e.g. specific vulnerable groups or communities). Finally, extracted data will be systematically compared and divergences acknowledged; limitations of the vulnerability assessment tools will be noted.

Before extracting the relevant information, we will sample 5 papers and test the extraction criteria, which will subsequently be revised, if necessary.[24(p.4).] We will not assess each

study's methodology for quality, pursuant to guidelines for scoping reviews.[25]

Data synthesis

The results of the scoping review will be presented in a table. A narrative summary of the findings and how they relate to our objectives will be provided.

Ethics and Dissemination

Ethical approval is not required because this study does not involve collection of primary data. Findings of the scoping review will be summarized in a one-page brief containing details on key results and recommendations for the SoNAR-Global partners in Bangladesh, Ukraine and Uganda.[26(p.16)] The review of existing assessment tools will be disseminated to our program partners and the public. Local resources permitting, key partners and regional stakeholders will pilot the tool best suited to infectious disease or AMR-related emergencies.

Patient and Public Involvement

No patient involved.

Author Statement

MJ and RK conceptualized the research, MJ wrote the protocol, LL helped in writing and editing the protocol, TG-V, MD, DN, EJ and RK reviewed and edited the protocol.

Acknowledgement

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Competing interests statement

None declared.

Data statement

All data can be requested from the corresponding author.

Registration

No registration foreseen.

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Supplementary File

Search strategies

Database: Global Health database (ovid), 4 March 2019

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1 ((vulnerab* or disadvant* or low income or at risk* or marginal* or key) adj6 (population* or group* or people* or communit*)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (32565)

2 exp infectious diseases/ (48098)

3 exp ebolavirus/ (3701)

4 exp crimean-congo haemorrhagic fever virus/ (1409)

5 exp marburgvirus/ (651)

6 exp lassa virus/ (702)

7 exp rift valley fever virus/ (1577)

8 exp measles virus/ (7768)

9 exp influenza/ (28512)

10 exp drug resistance/ (97089)

11 (infectious diseas* or ebola* or measles or influenza* or flu).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (119288)

12 ((marburg or lassa or rift valley or congo) adj4 (virus* or fever)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (4260)

13 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 (210937)

14 1 and 13 (2299)

15 ((vulnerab* or rapid or barefoot or participat* or context* or qualitat* or quantitat*) adj6 (assess* or approach* or analys* or evaluat*)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (61363)

16 (vulnerab* adj6 measur*).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (293)

17 toolkit*.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (585)

18 mixed method*.mp. (3802)

19 15 or 16 or 17 or 18 (64836)

20 14 and 19 (120)

21 (one health or human* environment* or human* plant* or zoonotic* disease* or zoonos* or vector* born* or one medicin or bio social* or biosocial*).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes] (126786)

22 14 and 21 (257)

23 22 not 20 (236)

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Database: Medline, 1 April 2019

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1 Vulnerable Populations/ (9196)

2 ((vulnerab* or disadvant* or low income or at risk* or marginal* or key) adj5 (population* or group* or people* or communit*)).ti,ab,kf,kw. (73757)

3 1 or 2 (80138)

4 ((vulnerab* or rapid or barefoot or participat* or context* or qualitat* or quantitat*) adj6 (assessment* or approach* or analy* or evaluat* or measur* or tool*)).ti,ab,kw,kf. (404666)

5 mixed method*.ti,ab,kf,kw. (16584)

6 4 or 5 (416134)

7 3 and 6 (5320)

8 exp Communicable Diseases/ (33526)

9 hemorrhagic fevers, viral/ or hemorrhagic fever, crimean/ or hemorrhagic fever, ebola/ or lassa fever/ or marburg virus disease/ or rift valley fever/ (8588)

10 Measles/ (13090)

11 Influenza, Human/ (46095)

12 (infectious diseas* or ebola* or measles or influenza* or flu).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (250987)

13 ((marburg or lassa or rift valley or congo) adj4 (virus* or fever)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (5286)

14 8 or 9 or 10 or 11 or 12 or 13 (277516)

15 exp anti-bacterial agents/ or exp antifungal agents/ or exp antiparasitic agents/ or exp antiviral agents/ (1241843)

16 (antibiotic* or anti biotic* or antimicrob* or anti microb* or antibacterial* or anti bacterial* or antifungal* or anti fungal* or antiparasit* or anti parasit*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (680643)

17 15 or 16 (1494415)

18 drug resistance/ (45425)

19 resistan*.mp. (1030696)

20 ((suboptimal*' or 'sub optimal*') adj4 ('use' or utilization* or utilisation* or usage or prescription* or prescrib* or administrat*)).ti,ab,kw,kf. (1456)

21 overuse.ti,ab,kw,kf. (9645)

22 18 or 19 or 20 or 21 (1040537)

23 17 and 22 (283378)

24 exp drug resistance, microbial/ or exp drug resistance, multiple/ (165500)

25 (amr or antimicrobial resistance*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (19481)
26 23 or 24 or 25 (315780)
27 disasters/ or exp disaster planning/ or exp emergencies/ or exp natural disasters/ (76941)
28 exp Climate Change/ (15831)
29 (disaster* or outbreak* or crisis or crises or natural hazard* or emergency or emergencies or climate change or pandemic* or endemic*).ti,ab,kf,kw. (506063)
30 (storm or storms or flood* or drought* or earthquake* or wildfire* or avalanche* or tornado* or cyclon* or hurrican*).ti,ab,kf,kw. (57428)
31 27 or 28 or 29 or 30 (579969)
32 (one health or human* environment* or human* plant* or zoonotic* disease* or zoonos* or vector born* or one medicin* or bio social* or biosocial*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (33611)
33 One Health/ (141)
34 Zoonoses/ (15656)
35 32 or 33 or 34 (33611)
36 7 and 14 (114)
37 7 and 26 (22)
38 7 and 31 (645)
39 36 or 37 or 38 (720)
40 limit 39 to yr="1978 - 2019" (720)
41 35 and 40 (24)
42 40 not 41 (696)

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Database: Global index Medicus (WHO), 8 April 2019

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vulnerab*
AND assess* OR approach* OR analy* OR evaluat* OR measur* OR tool*
AND disaster* OR emergency OR emergencies OR outbreak* OR crises OR crisis OR "natural hazard*" OR "climate change" OR pandemic* OR endemic*
OR infectious disease* OR communicable disease* OR transmiss*
OR AMR OR anti*microbial resist* OR anti*biotic restist* OR anti*biotic stew* OR anti*fungal resist* OR anti*parasit* restist* OR anti*viral resist*
OR "drug* resistan*" AND (microbial* OR bacteria* OR multiple OR antibiotic* OR fungal* OR viral*)
OR one health OR human*environment OR human*plant OR zoonotic disease* OR zoonos* or vector*born*

or one medicin* or bio*social* or biosocial*

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Database: AJOL (African Journal online), 3 April 2019

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vulnerability assessment* or approach* or analy* or evaluat* or measur* or tool*

Database: Epistemonikos, 11 April 2019

Full query: (title:(vulnerab*) OR abstract:(vulnerab*)) AND (title:(population* OR group* OR people* OR communit*) OR abstract:(population* OR group* OR people* OR communit*)) AND (title:(vulnerab* OR qualitat* OR quantitat* OR participat* OR barefoot*) OR abstract:(vulnerab* OR qualitat* OR quantitat* OR participat* OR barefoot*)) AND (title:(assessment* OR approach* OR analy* OR evaluat* OR measur* OR tool*) OR abstract:(assessment* OR approach* OR analy* OR evaluat* OR measur* OR tool*)) AND (title:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR communicable diseas* OR ebola* OR "marburg virus" OR lassa* OR "rift valley fever" OR "crimean congo hemorrhagic fever" OR "crimean congo haemorrhagic fever" OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR emergency OR emergencies OR pandemic* OR endemic*) OR abstract:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR communicable diseas* OR ebola* OR "marburg virus" OR lassa* OR "rift valley fever" OR "crimean congo hemorrhagic fever" OR "crimean congo haemorrhagic fever" OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR emergency OR emergencies OR pandemic* OR endemic*))

1) (title:(vulnerab*) OR abstract:(vulnerab*))

2) AND (title:(population* OR group* OR people* OR communit*) OR abstract:(population* OR group* OR people* OR communit*))

3) AND (title:(vulnerab* OR qualitat* OR quantitat* OR participat* OR barefoot*) OR abstract:(vulnerab* OR qualitat* OR quantitat* OR participat* OR barefoot*))

4) AND (title:(assessment* OR approach* OR analy* OR evaluat* OR measur* OR tool*) OR abstract:(assessment* OR approach* OR analy* OR evaluat* OR measur* OR tool*))

5) AND (title:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR communicable diseas* OR ebola* OR "marburg virus" OR lassa* OR "rift valley fever" OR "crimean congo hemorrhagic fever" OR "crimean congo haemorrhagic fever" OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR emergency OR emergencies OR pandemic* OR endemic*) OR abstract:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR communicable diseas* OR ebola* OR "marburg virus" OR lassa* OR "rift valley fever" OR "crimean congo hemorrhagic fever" OR "crimean congo haemorrhagic fever" OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR emergency OR emergencies OR pandemic* OR endemic*))

Full query: (title:((title:(vulnerable groups) OR abstract:(vulnerable groups)) AND (title:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR pandemic* OR endemic*) OR abstract:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR emergency OR emergencies OR pandemic* OR endemic*))) OR abstract:((title:(vulnerable groups) OR abstract:(vulnerable groups)) AND (title:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR pandemic* OR endemic*) OR abstract:("climate change" OR disaster* OR outbreak* OR disease outbreak* OR infectious diseas* OR antibiotic resistan* OR antimicrobial resistan* OR crisis OR crises OR "natural hazard" OR "natural hazards" OR emergency OR emergencies OR pandemic* OR endemic*))))

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Reporting checklist for protocol of a systematic review.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a
Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	n/a
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify the	13

		guarantor of the review	
Amendments			
	#4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	n/a
Support			
Sources	#5a	Indicate sources of financial or other support for the review	13
Sponsor	#5b	Provide name for the review funder and / or sponsor	13
Role of sponsor or funder	#5c	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	13
Introduction			
Rationale	#6	Describe the rationale for the review in the context of what is already known	4
Objectives	#7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	6,7
Methods			
Eligibility criteria	#8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	8
Information sources	#9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	9
Search strategy	#10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	16,17,18
Study records - data management	#11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	11
Study records -	#11b	State the process that will be used for selecting studies	11

selection process		(such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	
Study records - data collection process	#11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	11
Data items	#12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	11
Outcomes and prioritization	#13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	8
Risk of bias in individual studies	#14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	n/a
Data synthesis	#15a	Describe criteria under which study data will be quantitatively synthesised	n/a
Data synthesis	#15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	n/a
Data synthesis	#15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	12
Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the type of summary planned	12
Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	n/a
Confidence in cumulative evidence	#17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	n/a